Thermal-Neutron-Induced Fission of ^{243}Cm: Light-Peak Data from the Lohengrin Mass Separator

I. Tsekhanovich[1], N. Varapai[2], D. Rochman[3], G. Simpson[1], V. Sokolov[4], F. Storrer[5], G. Fioni[6], A. Ilham[7]

[1] *Institut Laue-Langevin, 6 rue J. Horowitz, BP 156, 38042 Grenoble France*
[2] *EC-JRC IRMM, Retieseweg B-2440 Geel, Belgium*
[3] *Los Alamos National Laboratory, LANSCE-3, Los Alamos, NM 87545 USA*
[4] *Petersburg Nuclear Physics Institute, 188350 Gatchina Russia*
[5] *DRI, CEA/Saclay, 91191 Gif-sur-Yvette France*
[6] *DSM/DAPNIA, CEA/Saclay, 91191 Gif-sur-Yvette France*
[7] *ES Division, Lawrence Berkeley National Laboratory, USA*

The mass separator Lohengrin, at the Institut Laue-Langevin in Grenoble (France), was used to measure yields and kinetic energies of light fission products with masses from A=72 to A=122 from the fission of the ^{244}Cm* compound nucleus, induced by thermal neutrons. The use of an ionisation chamber as a detection device, in the $\triangle E - E$ mode, allowed also the isotopic yields to be determined for the very-light masses measured (up to A=90).

The fission-fragments' kinetic energy was found to remain practically constant for all masses starting from the very light ones and up to approximately the onset of the mass-yield descent towards the symmetry region. There, the kinetic energy shows a sharp fall, resulting in a strong change of its value within only a few mass numbers. These observations are in accordance with systematics on the kinetic-energy behaviour known from the fission of other compound nuclei.

A comparison has been made of the results obtained on the mass yields with those from the fission ^{245}Cm as well as with the data given by the $JEF-2.2$ and $ENDF/B-VI$ libraries. The presence of two additional neutrons in the ^{246}Cm* compound nucleus manifests itself only for the masses on the right wing of the peak (more symmetric mass splits), as a difference in the mass yields. For more lighter masses, the two experimental data sets practically coincide. Among the libraries, the $ENDF/B-VI$ data were found to agree best with the experimental results, with the exception for a very few masses in the super-asymmetric (A <80) and truly-symmetric ($\sim A$=120) mass regions.

Finally, a comparison encompassing all experimental data on mass yields measured so far on the Lohengrin mass separator is made for fission of different compound nuclei. The intersection of different mass-yield curves in the super-asymmetric mass region is pointed out, emphasising the stabilising role of the Z=28 and N=50 shells in the light fragments, throughout a variety of nuclei undergoing fission.

Email: tsekhano@ill.fr